The EVD Analysis Tool

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Naive Idea/Motivation

- The idea for this tool was born at the beginning of the summer.
- It was to be used for multiple track events, where the automatic algorithms might not yet be as successful as we'd like and ArgoNeuT has some data that needs to be analyzed.
- The Human eye+brain is a great instrument we could use to guide the reconstruction.
- The idea was to use existing pieces of code e.g. line drawing in EVD, seeds+Bezier Tracks+Calorimetry to obtain reasonably quick results for a subset of events.
- The user should have an option to add/remove hits from a curve useful to resolve overlapping tracks.

The Brutal (LArSoft) Reality

- The EVD is not designed to do analysis.
- It's an analyzer, so it can't “produce” any objects.
- You can run producers in the same job though (EVD as analyzer).
- You can modify the parameters of these producer modules in the EVD and rerun a given event multiple times if desired.
- The EVD can't “produce” objects, so it's hard to pass anything tot these producers. And even if you could:
- You cannot save anything to file.

The Sting
(Don't try this at home)

- Create a dummy producer module `GraphCluster` that creates clusters and associations with hits.
- Transfer the hit information from the EVD via a service called `InfoTransfer`. There are some evil tricks involved.
- Further producer modules can then run oblivious to this evil trickery by assuming `GraphCluster` is the clustering algorithm.
- You can go up to Calorimetry and PID and use Mitch's Calorimetry display.
- You still can't save the results.

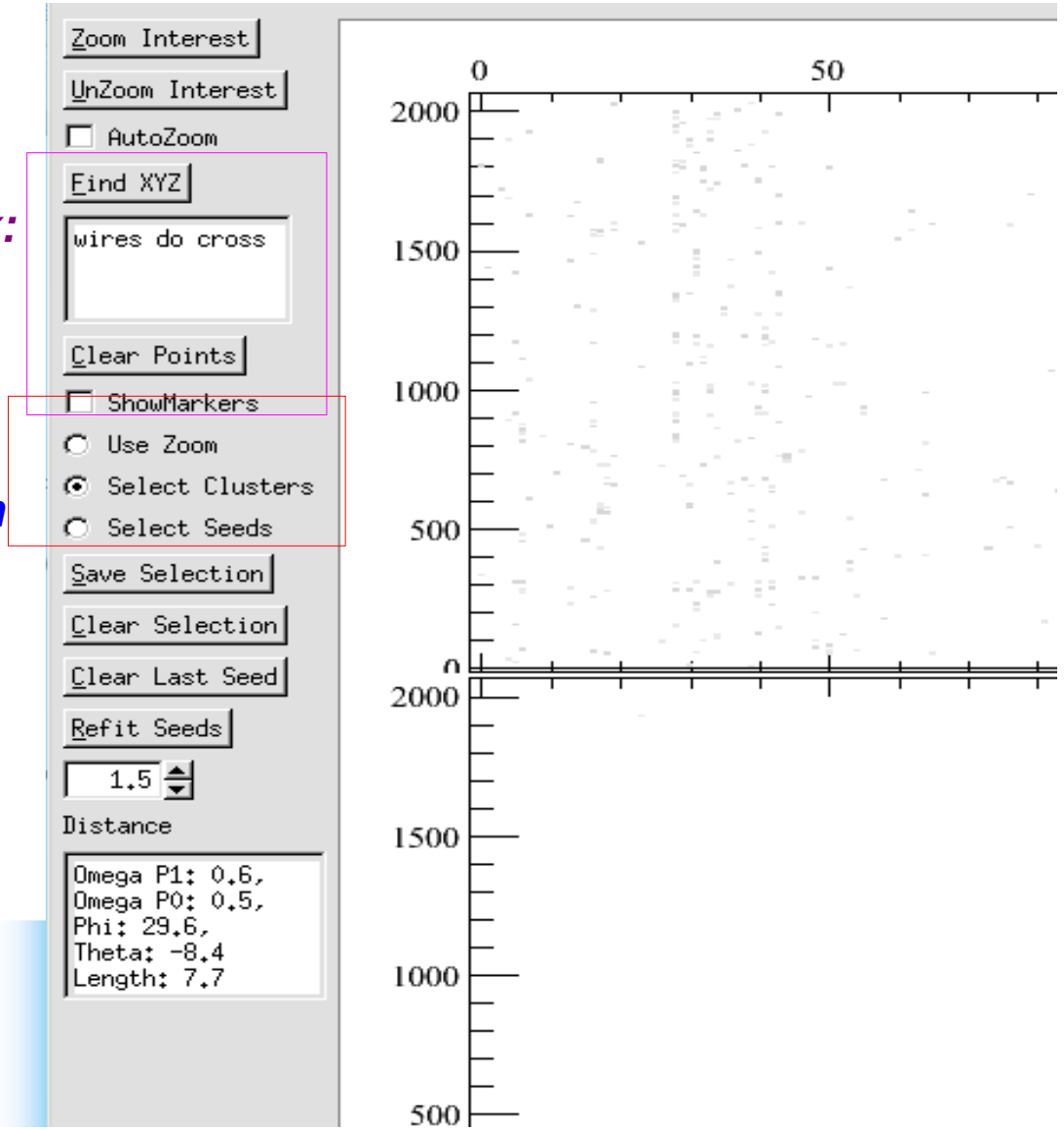
Current Status

- Ellen Klein did tons of work during the summer coding up the bulk of the code and the first working version: see uBooNE - DocDB# 2124
- We got the clustering to work, but never got to the seeds and Bezier Tracks.
- Since then, the code has been ordered and reorganized a bit making the EVD more stable in the process.
- The Side panel has been reorganized somewhat and the cluster projects into the third plane (useful for MicroBooNE)
- Ben Jones has added awesome Seed + Bezier Tracking capabilities – see next talk!

How it works
(Cluster Finding Version)

Ask me about this box:

Select which mode to run:
Use Zoom → Rectangular Zoom as before
Select Clusters → Draw lines to select sets of hits.



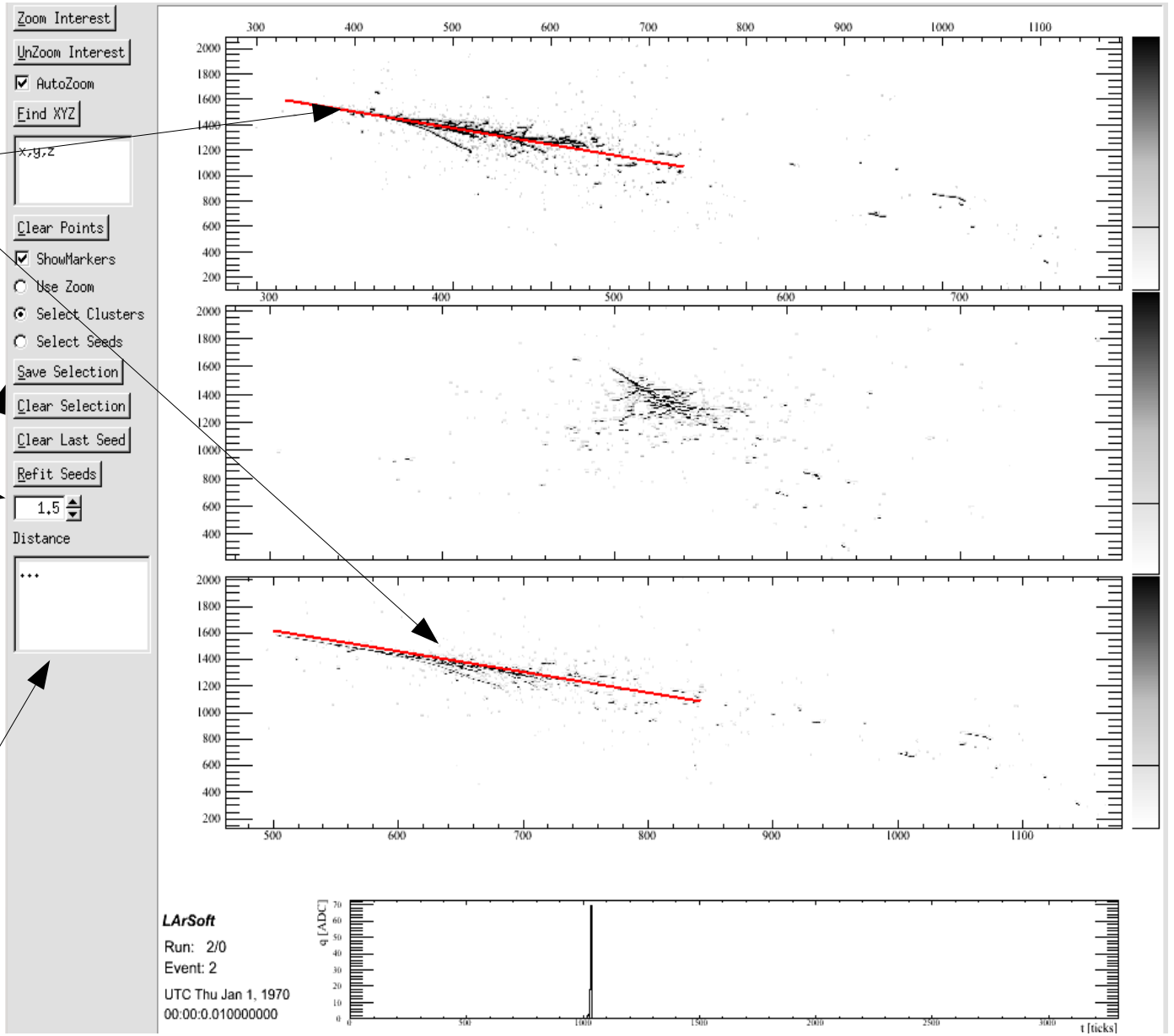
How it works
(Cluster Finding Version)

Draw lines around track or shower axis. It will appear in Red.

Set the width of the box if you think it's too big/too small (it's sort of in cm)

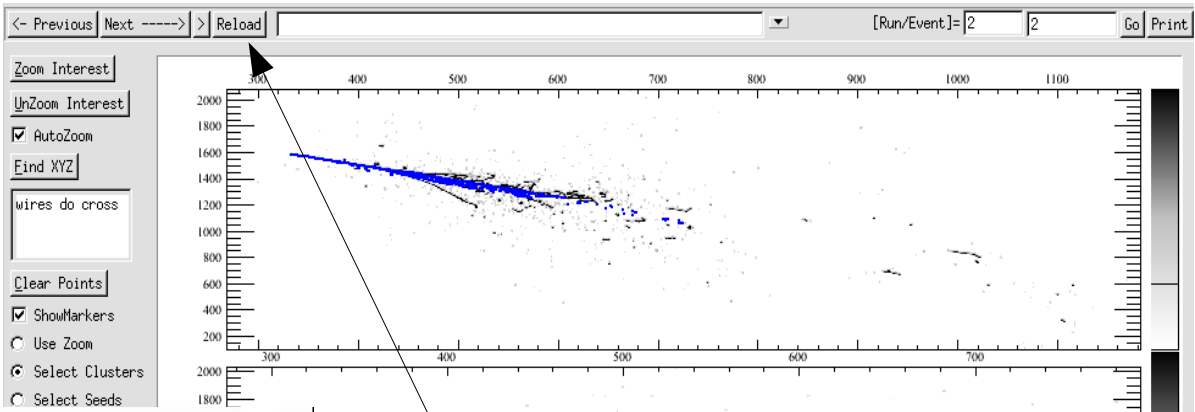
If you're happy with your selection – Save it.

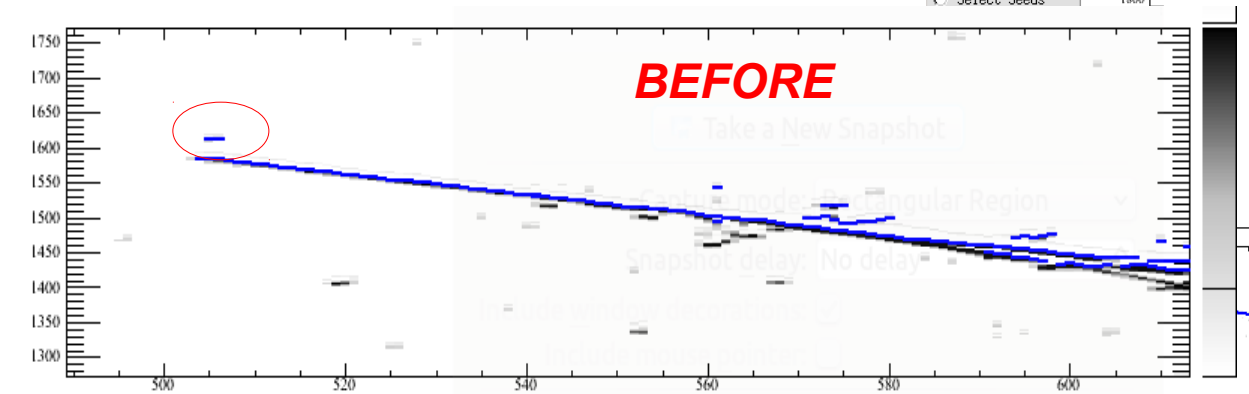
3D angles and estimated length of track will appear here.

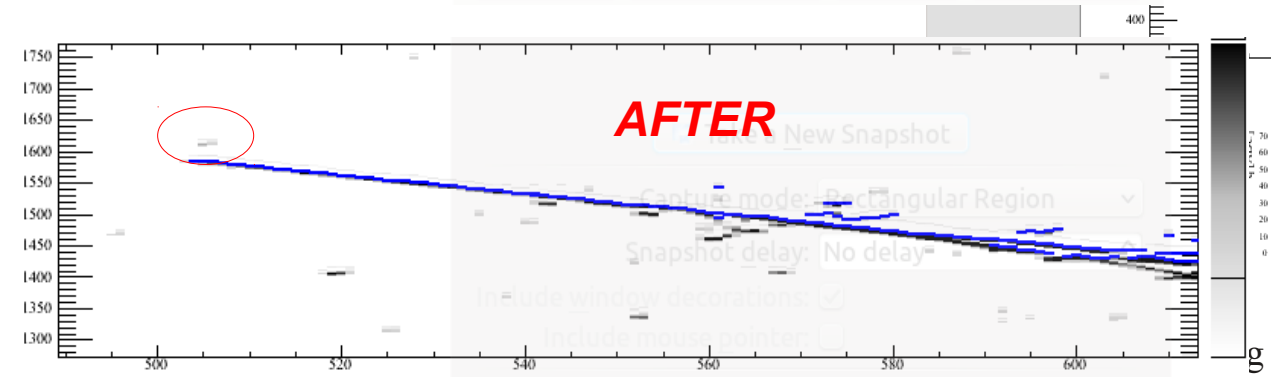


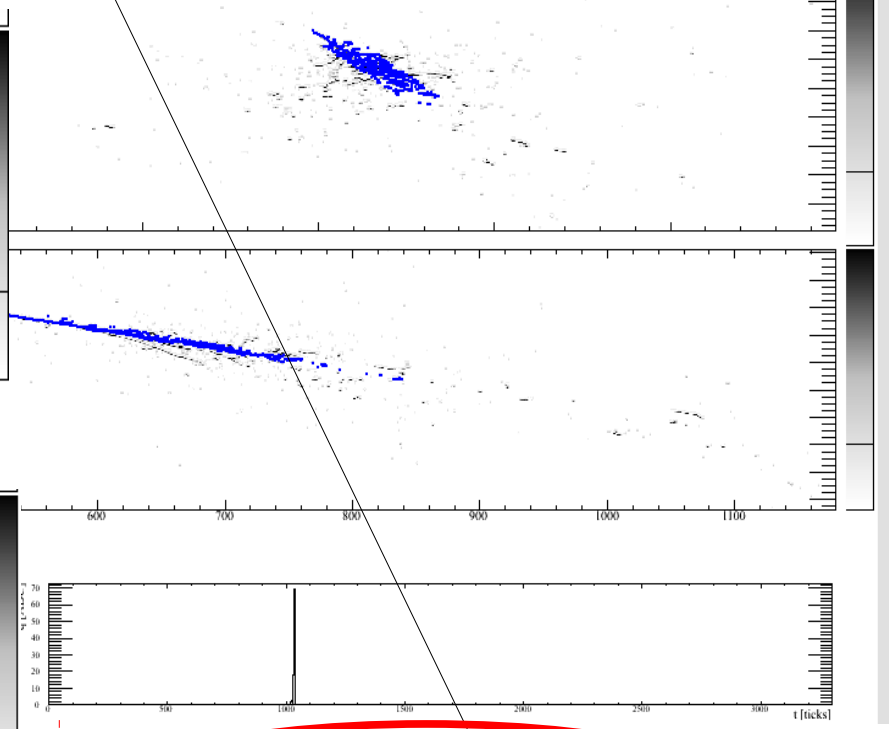
How it works
(Cluster Finding Version)

Selected Hits appear in Blue on all three planes (or two). If you don't like your selection, you can add/remove hits with a shift+click:







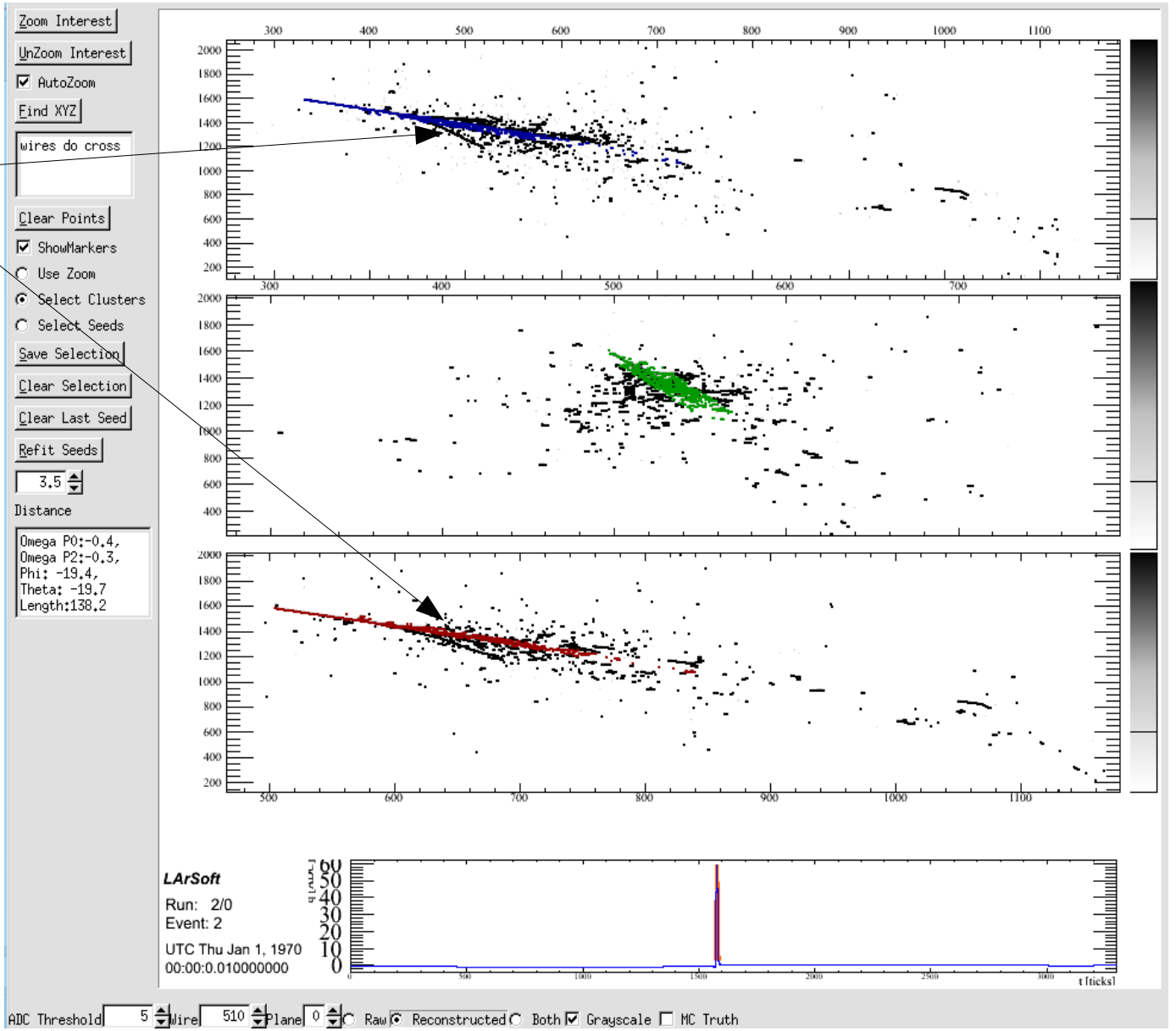


When satisfied with your selection press Reload:

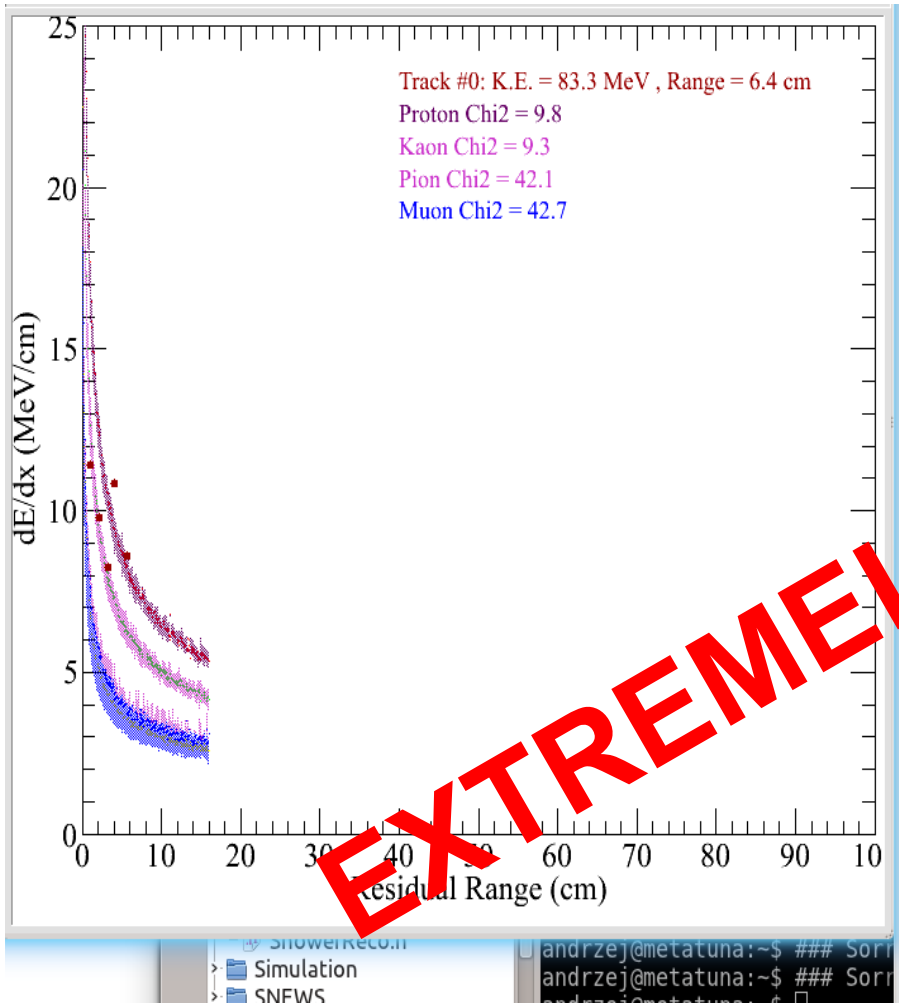
How it works
(Cluster Finding Version)

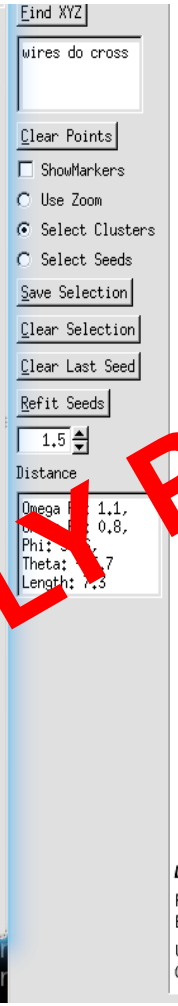
The Event has rerun and GraphCluster has produced shiny new Clusters that you can display, if you so choose in RecoDrawingOptions.

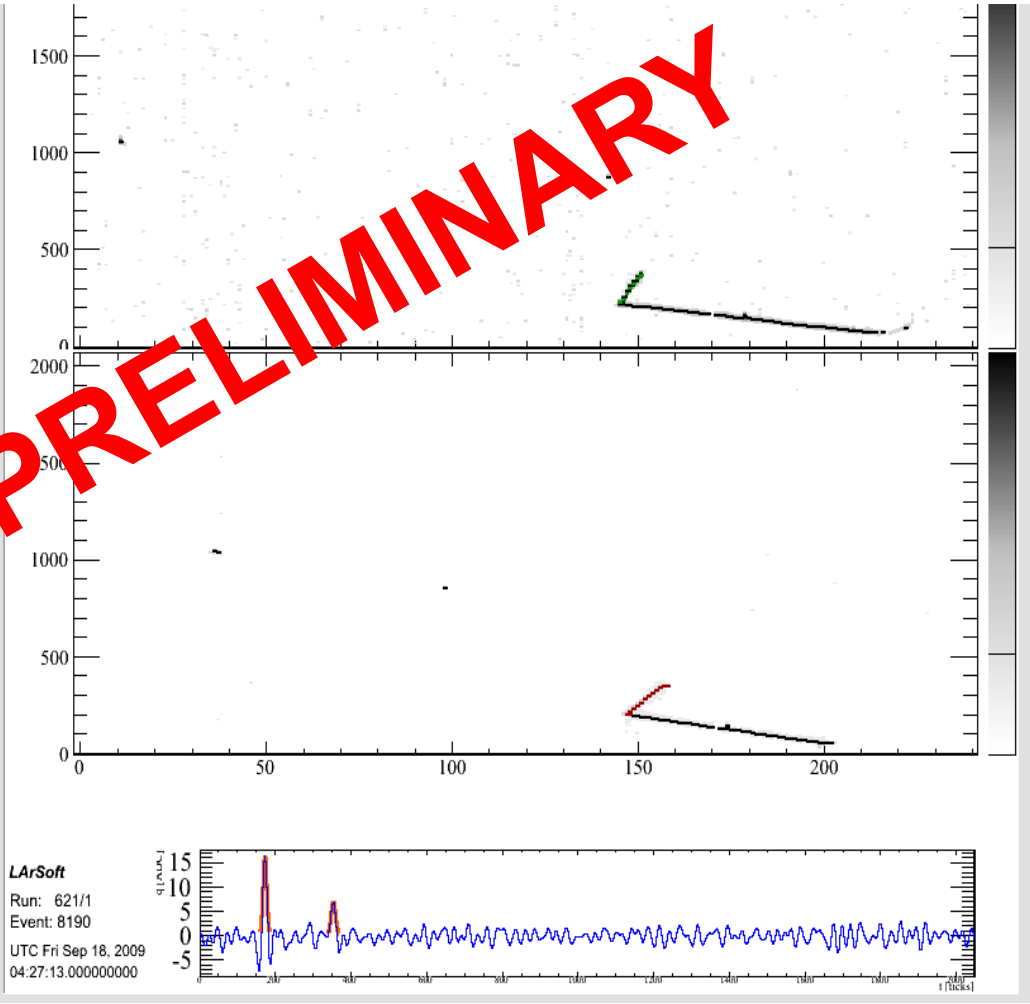
These clusters could have been passed on to further producer modules down the stream. For an Example, see next slide:



How it works
(Cluster Finding Version)







EXTREMELY PRELIMINARY

A Few Extra Details

- Example .fcl files on how to run a job wih the EVD tool are checked in to the repository (evd_t962_analysis.fcl and evd_uboone_analysis.fcl)
- If you really wanted to return to an event not have to redo your painstakingly shift+clicked selection a fix is on the way: `BootlegGraphCluster` is checked into uboone-offline (and will be to t962). It saves the hit wire-time coordinates to a .root file. It will then be possible to reread them into the event.

Conclusions

- The EVD analysis tool is ready to use – we'll be ironing out the last couple of quirks today.
- It should be useful in debugging and testing of algorithms (especially data) and handscans.
- Hurry and use it before it (hopefully) becomes obsolete.